SCAPA

Protective Action Criteria for Chemicals - Including AEGLs, ERPGs, & TEELs

Protective Action Criteria (PAC) for emergency planning of chemical release events are based on the following chemical exposure limit values:

- Acute Exposure Guideline Level (AEGL) values published by the U.S. Environmental Protection Agency (EPA)
- Emergency Response Planning Guideline (ERPG) values produced by the American Industrial Hygiene Association (AIHA)
- Temporary Emergency Exposure Limit (TEEL) values developed by SCAPA.

The PAC data set contains exposure limit values for more than 3,200 chemicals. Originally called the "TEEL data set," the name has been changed to the "PAC data set" to emphasize its inclusion of AEGLs and ERPGs as well as TEELs.

The PAC Data Set

The PAC data set (including AEGLs, ERPGs, and TEELs) is accessible as a searchable database, Excel workbook, and formatted tables:

- **Searchable PAC Database: AEGLs, ERPGs, and TEELs for Chemicals of Concern**
  The searchable database provides AEGLs, ERPGs, TEELs, and other useful information for chemicals of concern.
- **PAC Tables and Excel Workbook: AEGLs, ERPGs, and TEELs for Chemicals of Concern**

  AEGLs, ERPGs, TEELs, and other useful information for chemicals of concern are provided in two different formats – data tables (in .pdf format) and an Excel workbook.

  The current version of the PAC data set is: Revision 23 (August, 2007).

About SCAPA

Charter

Membership List

Working Groups

Emergency Management Updates

News and Meeting Announcement

SCAPA Meeting Highlights

SCAPA Teleconference Highlights

Action Items **(pdf)**

Contacts

Acronyms

Publications

Links

Site Map

Determining PAC Values

AEGLs, ERPGs, and TEELs all serve the same general purpose—to assist those who are responsible for planning for and responding to chemical emergencies. For any particular chemical, PAC values are generally determined from AEGL, ERPG, and TEEL values based on the following hierarchy:

- use AEGLs (including final or interim values) if they are available
- if AEGLs are not available, use ERPGs
- if neither AEGLs or ERPGs are available (as is the case for the vast majority of chemicals in the PAC data set), use TEELs.

In those relatively few cases where there is a departure from this hierarchy, the reason for this digression is is noted in a comment field in the PAC data set.

The PAC data set provides four different PAC benchmark values for each chemical (i.e., PAC-0, -1, -2, and -3). Starting with "0", each successive benchmark is associated with an increasingly severe effect that involves a higher level of exposure. The four benchmarks present threshold levels for:

0 - no adverse health effects

1 - mild, transient health effects

2 - irreversible or other serious health effects that could impair ability to take protective action

3 - life-threatening health effects

Only TEELs have a "0" level value, therefore the PAC-0 value is always the TEEL-0 value. A more detailed **definition of the individual AEGL, ERPG, and TEEL benchmarks** that are used to define PACs is presented by SCAPA.

Differences between AEGLs, ERPGs, and TEELs

There are subtle difference in the definitions of AEGLs, ERPGs, and TEELs and major differences in how they are developed and issued. Differences in their definitions include:

- AEGLs pertain to the "general population, including susceptible individuals," but ERPGs and TEELs pertain to "nearly all individuals."
- AEGLs are defined as the level "above which" certain health effects are expected, while ERPGs and TEELs are defined as the level "below which" certain health effects are *not* expected.
- ERPGs refer to exposure durations of 1 hour (with shorter periods for some chemicals), while AEGLs are developed for five time periods (i.e., 10-minutes, 30-minutes, 1-hour, 4-hours, and 8-hours), and TEELs are recommended for a peak 15-minute time Weighted Average (TWA) concentration.

AEGLs and ERPGs are developed through a rigorous review of primary sources of toxicological information, and the values eventually assigned to each chemical are individually peer reviewed. AEGLs are typically based on the results of a single key study. ERPGs are formed using a weight of evidence approach. Both of these processes are painstaking and time-consuming.

To produce limits in a more timely fashion while maintaining high quality, TEELs are derived from secondary data sources using a peer-reviewed algorithm. These sources are either existing exposure limits designed to prevent adverse effects in humans or experimentally derived toxicity parameters. It is important to emphasize that TEELs are considered temporary; they are approximations of potential values and are subject to change whenever new or better information becomes available.

In the following subsections we provide additional information and reference links for AEGLs, ERPGs, and TEELs.

AEGLs

The **U.S. EPA's AEGL Program** has developed AEGLs to describe the risk to humans resulting from once-in-a-lifetime, or rare, exposure to airborne chemicals. The National Advisory Committee and National Research Council Committee on AEGLs are developing these guidelines to help both national and local authorities, as well as private companies, deal with emergencies involving spills, or other catastrophic exposures"

AEGL Values for Select Chemicals is the official AEGL website. A **summary of all AEGL data** (pdf) is provided by the EPA. Information is also available from the EPA on the **AEGL development process** and **AEGL definitions**. *Because of the time lag between the release of new AEGLs and their incorporation in a revised PAC data set, please consult the AEGL website for the latest information on new AEGL releases.*

ERPGs

The **AIHA Emergency Response Planning Committee** is tasked with developing guidelines for responding to potential releases of airborne substances for use in community emergency planning. Their goal is to publish brief summaries and estimates of tolerable-effect thresholds, not intended as exposure recommendations, to assist in the planning for accidental, episodic chemical releases. The committee assigns evaluators to review and revise toxicology summaries on chemicals of concern. The full committee meets four times a year to review summary documents and to develop estimates of tolerable exposure levels that are published as ERPGs.

ERPGs Levels for Select Chemicals is the official listing of ERPG values. A summary of **ERPG information and definitions** is provided by SCAPA. **ERPG procedures and responsibilities** (pdf) were published in 2006.

Because of the time lag between the release of new ERPGs and their incorporation in a revised PAC data set, please consult the ERPG website for the latest information on new ERPG releases.

TEELs

Recognizing that AEGLs and ERPGs exist only for a limited number of chemicals (i.e., currently on the order of a few hundred), SCAPA developed TEELs so that DOE facilities could conduct appropriate emergency preparedness hazard analyses (EPHA) and perform consequence assessments for the thousands of chemicals lacking AEGLs or ERPGs. TEELs, first referred to as Alternative Guidelines Limits, were initially released in October 1992 and included values for approximately 65 chemicals without AEGLs or ERPGs. Today there are well over three thousand chemicals for which TEELs are used to provide one or more PAC values.

Definitions for the different TEEL levels (i.e., TEEL-0, -1, -2, and -3) are summarized on the **TEEL Definition** page. A list of useful **references related to TEELs** is provided by SCAPA.

A hierarchy of sources is used for developing TEELs. Because they are designed to prevent adverse health effects in humans, existing exposure limits are the preferred source of information for the development of TEELs. However, there are many chemicals for which there is no exposure limit information available. For these chemicals, toxicity parameters which have been experimentally derived, such as lethal dose 50% (LD_{50}) and lethal dose lowest (LD_{LO}), are used to set TEELs from mainly animal toxicology studies after making adjustments to extrapolate experimental results from animals to humans. If there are no exposure limits for a chemical, and toxicity parameters are either absent or represent insufficient information, a default methodology has been developed based on structure activity relationships and other available knowledge.

A detailed document on the TEEL method and practices will soon be published and a link to this document will be provided here.

The PAC/TEEL Development Team

Doug Craig has been the creative force behind the TEELs since their inception and continues to lead the PAC/TEEL development process. Rocky Petrocchi has also been involved with TEELs since their inception and he plays an important role in the development and review of PAC/TEEL values. Ray Lux programmed and maintains the Excel workbook that is used to develop and document PAC and TEEL values. Po-Yung Lu is that latest addition to the development team; he is currently playing a key role in reviewing and updating existing PAC/TEEL values.

Doug Craig

Rocky Petrocchi

Po-Yung Lu

The PAC/TEEL development activities are guided by the TEEL Advisory Group (TAG). The TAG is chaired by Tom Tuccinardi. Members include Jim Fairobent and Dave Freshwater from DOE/NA-41, Cliff Glantz (SCAPA Chair), Doug Craig, Rocky Petrocchi, Po-Yung Lu, and Richard Thomas.

Updates to the PAC Data Set

A major revision of the PAC data set will generally be released every year or two to accommodate the addition of a new set of chemicals or to update existing TEEL values (i.e., a multi-year effort is underway to review and update, as warranted, all TEEL values). Minor revisions to the PAC data set (as indicated by the addition of a letter after the revision number) will be released to incorporate updated AEGL and ERPG data or to correct small errors in the data set.

Need PACs for a New Chemical?

Please complete and submit this form: **Word format** | **PDF format**
If a chemical of interest does is not in the PAC data set, please complete this form and e-mail it to the contacts listed at the bottom of the form. Requested chemicals will be added to a list that is prioritized for TEEL development. Chemicals of critical importance can be given immediate attention.

Questioning an Existing TEEL Value?

Please complete and submit this form: **Word format** | **PDF format**
If you have a problem with an existing TEEL value (e.g., the value appears to be too high or too low), please document your concerns in this form and e-mail it to the contacts listed at the bottom of the form.

For Further Information…

The **Reference Documents related to TEELs** webpage provides links to published TEEL documentation.

For further inquiries about PACs or TEELs, please send an email to the **PAC/TEEL Development Team**. If you need to speak directly with a member of the team, your first point of contact should be either **Doug Craig or Rocky Petrocchi**.